Title: Hurricane Harry's School Store

Brief Overview:

This unit includes various tasks to help students develop a business plan to open a school store. The estimated profits from the store will be donated to hurricane relief and to the PTA. These lessons will concentrate on estimation, multiplication, and addition of decimals, data analysis, and the application of area. Finally, the students will write a letter of persuasion to the principal so that he/she will fund the start up costs of the school store.

NCTM 2000 Principles for School Mathematics:

- **Equity:** *Excellence in mathematics education requires equity - high expectations and strong support for all students.*
- **Curriculum:** *A curriculum is more than a collection of activities: it must be coherent, focused on important mathematics, and well articulated across the grades.*
- **Teaching:** *Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well.*
- **Learning:** *Students must learn mathematics with understanding, actively building new knowledge from experience and prior knowledge.*
- **Assessment:** *Assessment should support the learning of important mathematics and furnish useful information to both teachers and students.*
- **Technology:** *Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning.*

Links to NCTM 2000 Standards:

- **Content Standards**

Number and Operations

- *Understand numbers, ways of representing numbers, relationships among numbers, and number systems.*
- *Understand meanings of operations and how they relate to one another.*
- *Compute fluently and make reasonable estimates.*

Geometry

- *Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.*
- *Specify locations and describe spatial relationships using coordinate geometry and other representational systems.*
- *Apply transformations and use symmetry to analyze mathematical situations.*
- *Use visualization, spatial reasoning, and geometric modeling to solve problems.*

Measurement

- *Understand measurable attributes of objects and the units, systems, and processes of measurement.*
- *Apply appropriate techniques, tools, and formulas to determine measurements.*

Data Analysis and Probability

- *Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.*
- *Select and use appropriate statistical methods to analyze data.*
- *Develop and evaluate inferences and predictions that are based on data.*
- *Understand and apply basic concepts of probability.*

- **Process Standards**

Problem Solving

- *Build new mathematical knowledge through problem solving.*
- *Solve problems that arise in mathematics and in other contexts.*
- *Apply and adapt a variety of appropriate strategies to solve problems.*
- *Monitor and reflect on the process of mathematical problem solving.*

Reasoning and Proof

- *Recognize reasoning and proof as fundamental aspects of mathematics.*
- *Make and investigate mathematical conjectures.*
- *Develop and evaluate mathematical arguments and proofs.*
- *Select and use various types of reasoning and methods of proof.*

Communication

- *Organize and consolidate their mathematical thinking through communication.*
- *Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.*
- *Analyze and evaluate the mathematical thinking and strategies of others.*
- *Use the language of mathematics to express mathematical ideas precisely.*

Connections

- *Recognize and use connections among mathematical ideas.*
- *Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.*
- *Recognize and apply mathematics in contexts outside of mathematics.*

Representation

- *Create and use representations to organize, record, and communicate mathematical ideas.*
- *Select, apply, and translate among mathematical representations to solve problems.*
- *Use representations to model and interpret physical, social, and mathematical phenomena.*

Grade/Level:

Grades 4-6

Duration/Length:

Four 60 minute periods

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Estimation
- Multiplication and addition of decimals
- Knowledge of area
- Reading and constructing graphs
- Writing to persuade

Student Outcomes:

Students will:

- add and multiply decimals.
- estimate profits.
- analyze and construct data displays.
- write a persuasive letter.
- construct area of an advertisement with given criteria.

Materials/Resources/Printed Materials:

- Graph paper
- Pencils
- Colored pencils or markers
- Calculators
- Resource sheets as indicated
- One inch grid paper
- Ruler
- Student Response Book
- Post-It notes (1 per child)
- Dictionaries (1 per small group)
- Bulletin board paper
- Overhead projector or chalkboard

Development/Procedures:

DAY 1:

- Begin the unit with a discussion of the students' favorite businesses. Use a web on the chalkboard to record the names of their favorite businesses. (Example: Taco Bell).
- Ask the students what elements are necessary to run a successful business, keeping in mind that this is a global question and not limited to one type of business. Use the web to guide the discussion.
- Ask the students what they would need to open a business such as a school store. The Placemat Strategy is explained in Teacher Resource #1. Use this strategy to allow the students to express their ideas about what is needed to open a school store.
- Discuss the ideas that the students generate, making sure that these concepts are addressed: advertising, inventory, profits, supply, and demand.
- Distribute the Student Response Book. Read and discuss the vignette on Page 1.
- Direct the students to analyze the graph of "School Store Sales at Green Pines Elementary School"on Student Response Book Page 2. Use the questions at the bottom to lead a discussion about trends in the data and how this could apply to their store. Elicit that there may be reasons why sales are higher at certain times of the year.

- Look at the graph, "September Sales" (Student Response Book Page 3). Ask the students what they can learn from this graph. Students should notice that some items sell better than others. Discuss why this information is important to know when opening a store.
- Extend this idea by asking the students how they would determine what would be the best items to sell in *their* school store. One possible response should be a survey of other classes. This is known as a market survey. Direct students to respond to the prompt at the bottom of the graph.
- Have the students break into small groups to create the T-chart on Student Response Book Page 4 which should include the items to be sold in their school store. Circulate among the students to be sure that they justify their responses. Make a class tally of the student choices. From this information, the class should come to a consensus of what items they wish to survey.
- Record the class consensus on Student Response Book Page 5, "Our Market Survey".

DAY 2:

- Send groups of students throughout the school to take the survey. Give a time limit for their absence from the classroom. Some possible times would be morning work time, cafeteria times, or recess.
- Create a whole class graph using all the data that has been collected. (Bulletin board paper, an overhead, or the chalkboard can be used to record the data.)
- Discuss how the population of Green Pines Elementary School compares to your own school population. Use Student Response Book Page 6 to facilitate the discussion. Include in the discussion estimation strategies that lead the students to understand rounding to the nearest hundred is most appropriate in this situation. Then focus the discussion on the magnitude of the number line in relation to their estimates. Emphasize the concept of overestimation and underestimation, and when it would be appropriate to use either one. (Example: Since Green Pines has a population of 413, round to 400. If your school has a population of 578, round to 600. 600 is 1.5 times larger than 400.)
- Have students complete Page 6 independently. (While students are working, draw a number line on the chalkboard that is the same as the one on Page 6.)
- Distribute Post-It notes, one per student. Instruct students to write their estimate on the Post-It and place it on the number line that is on the chalkboard. (If you are using this as a formative assessment, you may want the students to also write their names on the Post-It note.)
- Lead students on a Gallery Walk to read classmates' estimates and number sentences. (A Gallery Walk is when everyone *quietly* walks around the classroom and reads the responses of other students. This should only take a few minutes.)
- Allow the students to change their estimate based on what they have now learned. Have them write their new estimate on the back of Page 6 and explain why they changed their estimate or kept it the same. Collect this work for a mid-assessment, if desired.
- Use Student Response Book Page 7, "Projected Inventory", as as homework assignment to reinforce the concepts presented in class as well as multiplication of decimals. Model the first example so that students understand what to do.

DAY 3:

- Review "Projected Inventory" homework from Student Response Book Page 7 with the students.
- Discuss wholesale costs with students. They need to understand that what they pay for an item is not the original cost. Continue the discussion by developing a definition for "Start Up Inventory". (The start up inventory is the number of supplies needed to begin the business.)

- Refer to Student Response Book Page 8. Complete the chart. Use the new totals columns from Page 7 and transfer that information to the number ordered column on Page 8, so that they can calculate the total cost of each item.
- Lead the students to see that the cost of total inventory would be the sum of the total cost column. (Encourage students to use the calculator to check their work.)
- Direct small groups of students to locate the definition of the word "profit". Discuss the meaning. Continue the discussion by asking the students why a business would want to make a profit and what may happen if the business does not make a profit.
- Read the top of Student Response Book Page 9. Determine a class consensus of what the percentage of profit should be for their school store.
- Direct students to calculate the profit necessary for each item to be sold in their school store by creating a chart on the back of Page 9. This will be their price list.
  (Example: Pencils are $0.14. If you want a 50% profit, you will need to multiply $0.14 x .50= n. Next, add the profit to the wholesale price for the final price. n + 0.14 = price per item. Use this process for each item on the list.)
- Work the students through the process of finding the projected profit for the school store. This information will be needed for their letter. It would be suggested to discuss the concept of overestimation and underestimation at this point. Many businesses choose to underestimate their profits as overestimation can lead to going out of business.
  Example: Cost of total inventory $ x %profit = projected profit $. In other words, $100 x .50 = $50. This is the amount of profit for one month. Extend the information to predict the profit for the ten months the school store is open. Compare to Green Pines Elementary sales on Student Response Book Page 2.
- Challenge students to come up with a way to let people know that they will be opening Hurricane Harry's School Store. They should come up with the idea of advertising.
- Write the following on the chalkboard:
  The PTA newsletter displays advertisements for the community. All ads are allowed 24 square inches of space. Design an ad for our new store using the criteria on Student Response Book Page 10, " Scoring Tool for Advertisement".
- Review the scoring tool with the students to help them understand what is expected for an exemplary advertisement.
- Use the one-inch grid paper, or unlined paper if desired. Complete the advertisement for homework.

DAY 4:

- Display all advertisements on the chalkboard. Elicit responses from the students as to which ads will be effective in advertising the school store. Lead a discussion which develops a list a characteristics that describe an excellent advertisement.
- Proceed to the Performance Assessment below.

Performance Assessment:

- Instruct students to write a letter to persuade the principal to donate the money to open the school store. Review the Scoring Tool on Student Response Book Page 10.
- Lead the students through the writing process. Begin with the use of FAT-P. (F= Form, A= Audience. T= Topic. P= Purpose) A pre-writing organizer of the teacher's choice and a draft should be completed in class. Depending on time allowances, the editing and final copy may be completed for homework, or continue the writing process with PQP and editing the next class period. (Note: P= Praise at least one good aspect of the work. Q=Question anything that is uncertain in the work. P= Polish anything that needs to be improved.)
- NOTE: This entire learning unit is actually a series of performance assessments.

Extension/Follow Up:

- Develop a schedule for workers (use of time).
- Use the memo from the principal to have students give a percentage of the profits to the PTA.
- Explore causes, locations, and seasons of hurricanes-helpful sites below:
  - www.nhc.noaa.gov
  - www.fema.gov
  - www.hurricanehunters.com
- Design the advertisement on unlined paper.
- Capital for the store may be raised by the sale of stock: dividends could be paid out.

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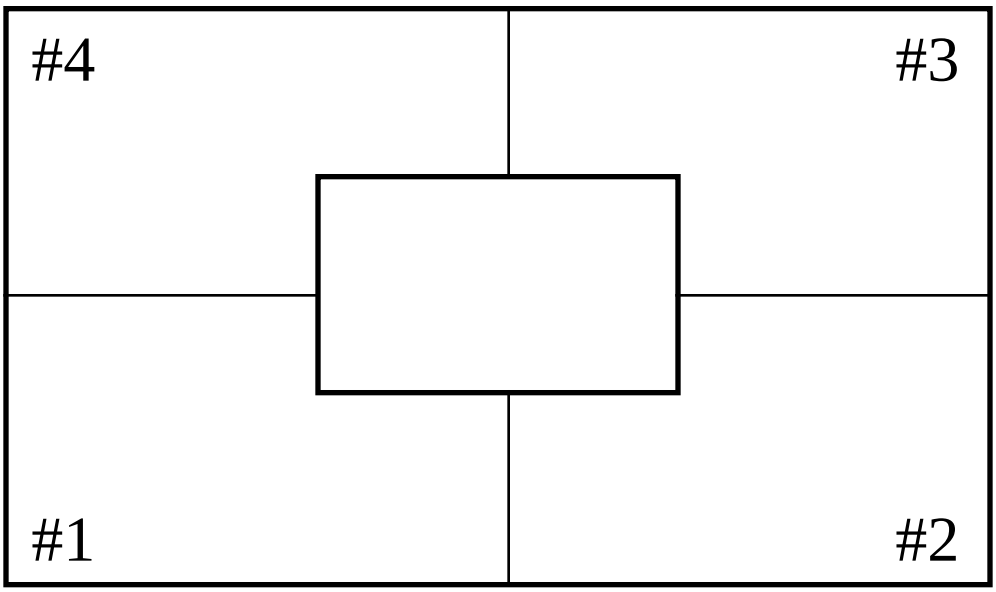
Placemat Strategy



1. Give a piece of large chart paper to each group of four students.

2. Instruct the students to draw a design like the one above.

3. Each student will choose a number (1-4) and then assume a role according to the chart.

# 1 Recorder	# 3 Timekeeper
# 2 Facilitator	# 4 Spokesperson

4. Pose a question to the students. (Example: What would you need to open a business such as a school store?) Let the students brainstorm all ideas by writing in the space in front of them.

5. Then, the facilitator will focus the discussion and the recorder will record all ideas in the center that are agreed upon by consensus. The timekeeper will remind the group of the time.

6. Finally, hang up the placemat. The spokesperson tells the rest of the class what their group has agreed upon.

Designed by Pat Baltzley, Baltimore County Public Schools

Hurricane Harry's School Store

"Get blown away by our prices!"

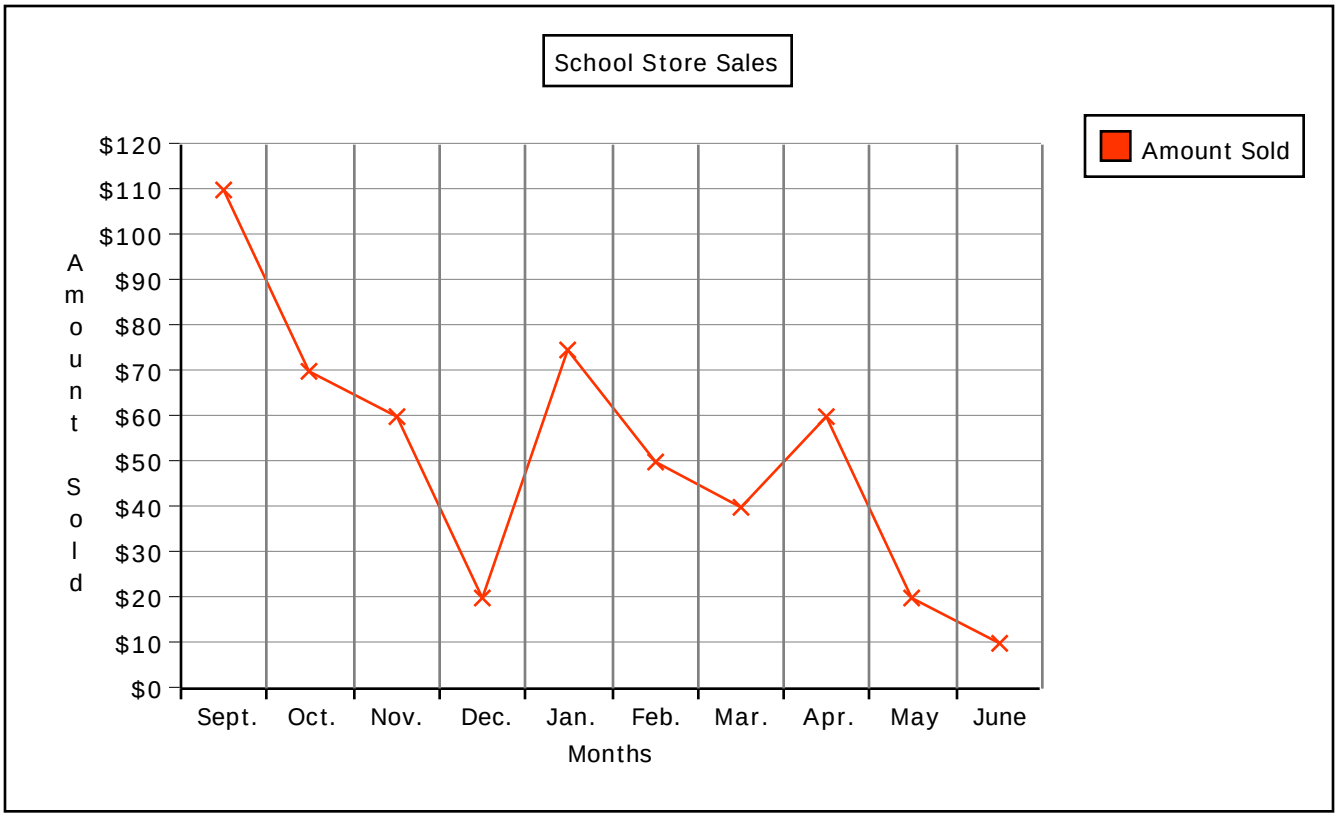
Student Response Book

A student from your class saw a news article detailing a hurricane in Florida. The student was concerned that the children in Florida lost their school and all of their supplies. Our class decided to raise money to aid the victims of the hurricane. After much discussion, the class chose to open a school store. All profits earned from the store will be sent to the families in Florida.

Our class realizes that there are several steps that must be done before we can open a school store. We will analyze data from another school's store, develop a business plan for our store, and compose a letter to persuade our principal to donate the money needed to get the store started.

Green Pines Elementary School

School Store Sales
2000-2001
Population: 413 Students



Analysis:

1. What are the trends in this data?

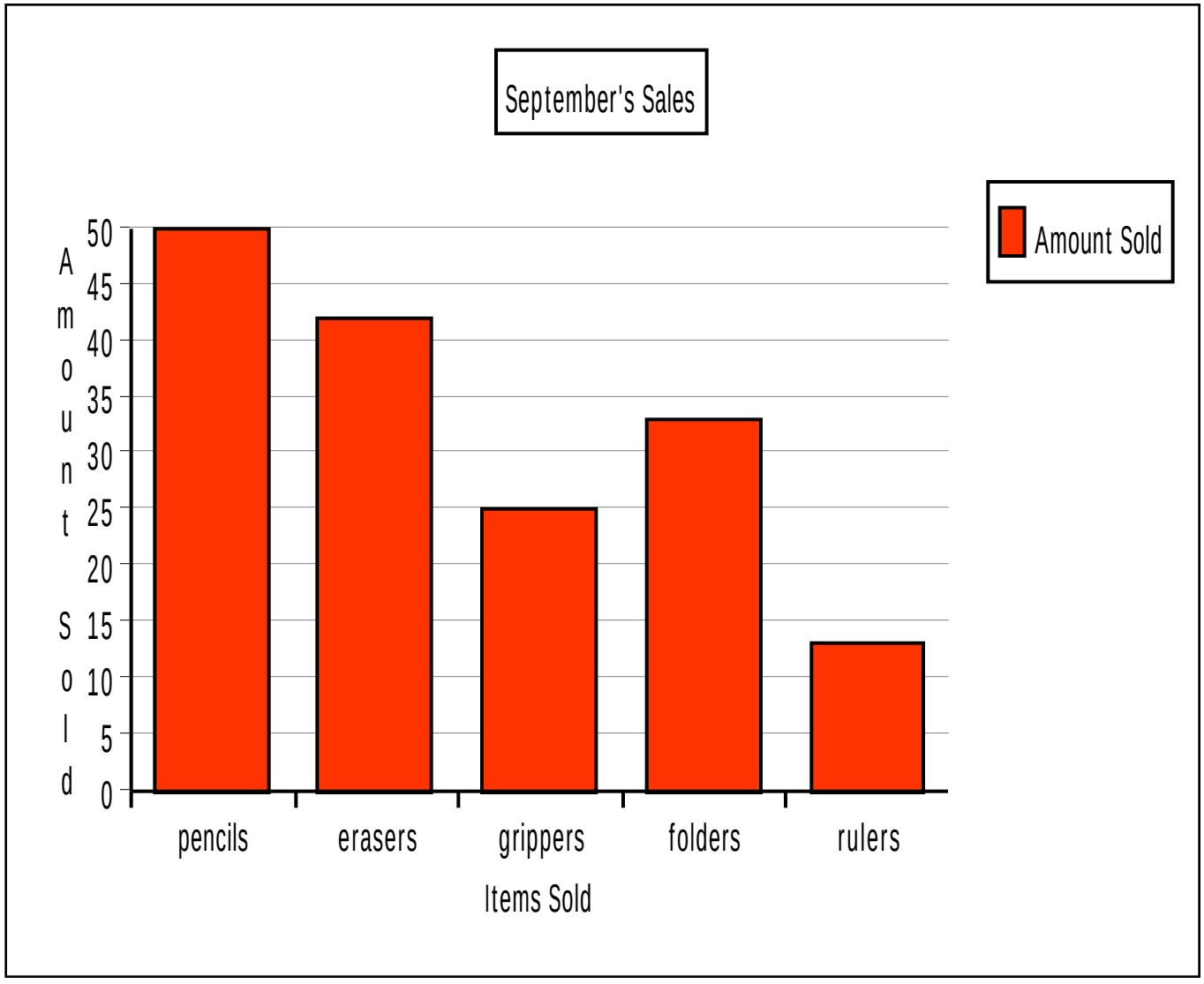
2. What could have caused these trends?

3. What could this school do to improve sales in the month of December?

Green Pines Elementary

September, 2000

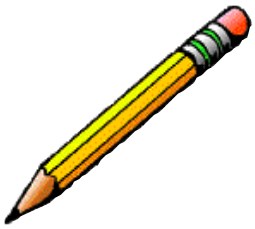
Sales



Now that you have learned about a market survey, what information do we need from this bar graph to create a market survey for our school?

Using the space below, create a T-Chart of items which you feel are important to include in our market survey. Justify your reason for each item.

Our Market Survey

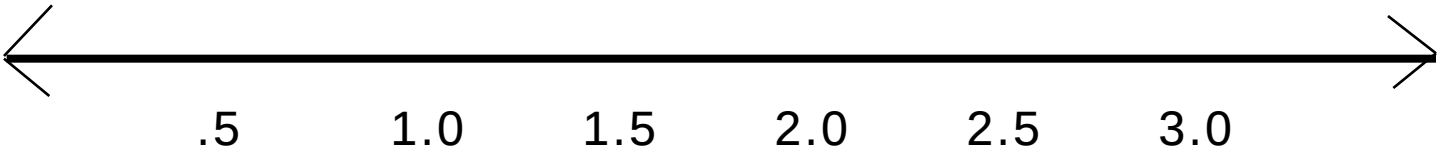


Possible school supplies
for sale at our store:

Class:

Items	Number of Students

Green Pines Elementary School has 413 students. Our school has _____students. Is our population larger or smaller than Green Pines? Estimate how much larger or smaller by circling one of the numbers on the number line below.



Why did you choose this estimate?

_____

_____

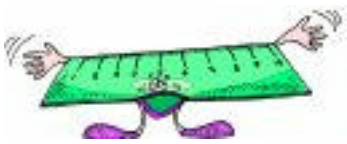
In the space below, write the number sentence that proves your thinking.

Now that you have determined how much larger or smaller our school is compared to Green Pines Elementary, complete the chart below. You will need to multiply the amount of school supplies sold at Green Pines by the decimal number chosen in class. This will help us determine the amount of supplies our school will need to order.

Projected Inventory

Supplies	Number Sold	Decimal	New Total
Pencils	50		
Erasers	43		
Grippers	25		
Folders	33		
Rulers	18		

Use the space below to show your work.



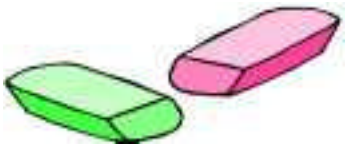
Before you can persuade our principal to invest money in the school store, you need to determine how much money will be needed to purchase the inventory.

Projected Cost for Start Up Inventory

Supplies	Cost	# Ordered	Total Cost
Pencils	$ 0.14		
Erasers	$ 0.16		
Grippers	$ 0.08		
Folders	$ 0.32		
Rulers	$ 0.26		

Cost of Total Inventory

Show your work in the space below.



Profit

All businesses need to make a profit. Our business needs to make a profit so we have money to send to the hurricane victims. Most businesses hope to make a 50% profit. In order to calculate a profit, we need to take the wholesale cost of the item and multiply it by the percentage of profit we hope to make.

With your group, decide how much profit you think is reasonable.

Our school store should consider a profit of _____%.

On the back of this page, create a table which will help you determine the profit earned on each school supply sold. Your table needs to include the name of the supply, the wholesale cost of one supply, the profit percentage, the profit earned on each item, and the sale price of the supply. Remember that all tables need a title.

Scoring Tool for Advertisement

Score	CUPS	Neatness	Message	Size
3	Has no CUPS errors	Ad is eye catching, colorful, and neatly done	The purpose of the ad is clearly stated	Ad is 24 square inches of space
2	Has less than two CUPS errors	Ad contains two of the above elements	The purpose of the ad is not clearly stated	Ad is nearly 24 square inches of space
1	Has more than two CUPS errors	Ad contains one of the above elements	The purpose of the ad is not stated	Ad is not 24 square inches of space

Scoring Tool for Business Letter

Score	CUPS	Persuades	Math Examples	Neatness
3	Has no CUPS errors	Uses 3 reasons to persuade	Uses 2 math examples to support reasons	Uses student's best cursive handwriting
2	Has less than two CUPS errors	Uses 2 reasons to persuade	Uses 1 math example to support reasons	Uses cursive handwriting
1	Has more than two CUPS errors	Uses less than 2 reasons to persuade	Uses 0 math examples to support reasons	Not acceptable handwriting

Hurricane Harry's School Store

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